

ARTICLE VII.

THE PREDISPOSING CAUSES OF ANEURISM. A STATISTICAL INQUIRY. By JOHN B. HAMILTON, M.D., Supervising Surgeon-General of the U. S. Marine Hospital Service, Prof. of Surgery in University of Georgetown, D. C.

I HAD been of opinion for some years that diseases of the heart and circulatory organs in seamen have, for their greatest predisposing cause, the combined effect of heat and moisture while engaged in exhausting occupation, together it might be with rapid diurnal change of temperature. To establish, if possible, the fact, I commenced the inquiry, the result of which not only modified that opinion, but seemed to overthrow many others strenuously urged by writers upon the subject. If, in the remarks which follow, it is noticed that positive deductions proving the real causes of the disease are wanting, it does not prove that they are valueless, for the upsetting of a false doctrine is only less valuable than the establishment of a truth.

When one turns to the text-books the great discrepancy of opinion therein is itself evidence that the truth, if known, has not made any great headway. Thus Chelius: "Aneurisms arise either of their own accord or after determinate external influence." He mentions rheumatism, gout, scrofula, syphilis, mercury, and chronic alcoholism as "internal causes," and "wounds, violent efforts in lifting weights, in jumping, coughing, and the like," as "external causes." Richerand stated that he observed that the attendants of the surgical amphitheatre were peculiarly liable to aneurism, and he attributed it to the potations of alcohol which they drank, together with the exertion of carrying in the bodies to the amphitheatre. Guthrie gives muscular exertion as the greatest predisposing cause. Erichsen gives age, climate, and cachexia, and under the head of climate repeats the statement of the older writers that the disease is "far more frequent in cold than in hot countries." But in his judgment the habits of the people regulate its prevalence. In regard to cachexia, while mentioning the general opinion that syphilis predisposes to the disease, he does not think that there are statistics to warrant the conclusion. Phthisis, he asserts, is antagonistic to aneurism.

Sir George Ballingall states, in regard to syphilis as a causative agent, and as to the occupation of the soldier:—

"I may here mention a singular opinion of Baron Larrey as to the cause of some aneurisms, which he distinctly ascribes to a syphilitic virus giving rise to ulceration of the internal coat of the artery; and he narrates some cases in which the exhibition of mercury is said to have been followed by a diminution of the dilatation of the artery. Larrey's observations coincide with those of Scarpa and Sabbatier as to the formation and increase of the tumor, and his experience, I find, coincides with my own as to the infrequency of aneurism in what may be termed its spontaneous or idiopathic form amongst soldiers." (*Outlines of Military Surgery*, Edinburgh, 1852.)

Mr. Holmes, in his *System of Surgery*, thinks the assertion that syphilis and mercury predispose to aneurism is gratuitous. Alcoholism, he thinks, is an important factor, but he avoids the main issue by stating that in "general terms" . . . "anything may be a cause of aneurism which destroys the balance that ought to exist between the expansive force of the circulation and the reaction of the wall of the artery, so as to make the former preponderate." He, however, in *Quain's Dictionary*, states that it is very probable that chronic alcoholism has an influence in the causation of aneurism.

Prof. S. D. Gross says—

"Of the causes which induce spontaneous aneurism more frequently in one artery than in another, nothing definite is ascertained. Several circumstances, however, may be assigned as affording at least a plausible explanation. How far any one of these causes alone is capable of producing aneurism is altogether a matter of conjecture."

He observed its frequency in the southwestern region of the United States. He recognized the great prevalence of the disease among sailors, but thinks soldiers less frequently affected than common report gives credence for. Mercury and syphilis, "and the inordinate use of spirits are supposed to predispose to the formation of aneurism, but how far, or in what degree, remains to be demonstrated."—(*System of Surgery*, 6th edition, vol. i. p. 690 *et seq.*)

Prof. D. Hayes Agnew (*Princ. and Prac. Surgery*, vol. i. p. 545) does not

"believe that occupation—that is, the ordinary employment performed by the working population—can be placed among the predisposing causes of aneurism. There is nothing in honest labor to produce arterial degeneration. . . . The doctrine that constitutional syphilis is a fruitful source of aneurism, and especially the intra-thoracic form of the disease, has for some time been gaining strength, and may be said at present to be deeply rooted in the medical mind. Our knowledge of the relation between syphilitic poison and arterial degeneration is entirely too meagre to warrant any hasty generalizations on this point. . . . If aneurism is so commonly the sequence of a syphilitic diathesis, how shall we explain the infrequency of the former disease in females, who furnish so many examples of the latter affection? During an experience of twelve years in the Philadelphia Hospital, an institution which is exceptionally rich in syphilitic disease, I never witnessed a single case of aneurism among the inmates of the venereal department."

Billroth states that, although atheroma is "a very frequent disease of old age, and occurs everywhere, aneurism is by no means confined to old persons. In Zurich, where atheroma is common, aneurism of the extremities is rare." He mentions the curious distribution of the disease over Europe, and says that—

"Special causes are little known; popliteal aneurism is most frequent among aneurisms of the extremities; the explanation has been sought in the superficial position of the popliteal artery, in the tension to which it is subjected on sudden movements, contusions, etc. Thus this form is said to occur especially often in England, in footmen who stand behind the carriages, but I must acknowledge that to me this seems improbable as the explanation given for chambermaid's knee. I am inclined to believe that the tendency to diseases of the artery, as to gout, is due to hereditary influence."

Dr. Myers thinks the prevalence of aneurism among British soldiers is primarily due to tight clothing. (London *Lancet*, Feb. 20, 1869.) Surgeon Major Robinson (*Ibid.* March 30, 1869) is of opinion that the stock and collar of the soldier have a great deal to do with it. Surgeon Henry Muscroft, while agreeing with both the foregoing surgeons that aneurism is more prevalent in the British army than in civil life, urges against Dr. Myers' statement that tight clothing is an important factor in its causation, that females, notably exempt, wore tight corsets continually; and Staff Surgeon Gore states (*Ibid.* p. 625, May, 1869) that aneurism is as prevalent at Honduras as at Good Hope, and that the West India regiments wear no collar and very loose clothing, owing to the climate, and the mortality from aneurism is 2.24. This point seems to have been overlooked by Mr. Barwell (*International Encyclopædia of Surgery*, vol. iii. p. 379), who thinks that Mr. Myers has conclusively proven that the prevalence of aneurism in the British army is "due to over-tight uniforms, especially the stock." Mr. Barwell, like many other recent writers, takes issue with Aitken and those claiming syphilis to be an especial factor in the production of aneurism, and says the burden of proof, which must rest on the affirmative, is entirely wanting. He thinks rheumatism and alcoholism are positive factors.

In a little pamphlet without date, published presumably during the time of the French Directory, by the Citizen Sarazin, Chirurgien, entitled *Instructions on the General Causes of Aneurism*, which may be found in the library of the Surgeon-General of the Army, it is stated that among the classes of food which are the most pernicious of all, and which contribute more to the destruction of the arterial coats than any others, are the acid unripe fruits, and the immoderate use of wine. Bad hygiene, especially of prisons, and the air in the vicinity of latrines, are stated by this author to be frequent causes. He also lays stress on climatic influences, and stated that in his opinion this is the principal and most ordinary cause of aneurism. He enunciates the truth, which modern statistics bear out, that this disease is ordinarily seen in those places where the atmosphere is usually humid, and of a high temperature. Also—

"The people who live in the valleys of the South, those whose constitution is feeble and delicate. The humidity of the air, with violent heat, produces a constant impression on the body to relax the vessels already enfeebled, and the same causes which produce other dangerous maladies produce this. Familiar experience proves that heat diminishes the action of all the solids of animal life, it evaporates the liquids considerably, relaxes the bloodvessels, and increases their capacity, and it is only with cold weather that they are again given their tone. If a capillary is examined under the microscope while the animal is living, and then a certain degree of heat is presented, it will be seen that this heat considerably distends the arteries and the veins, and when cold is applied they then contract. The habitual use of non-nutritious diet during the time when the body is growing, also aids in the formation of aneurism. The first years of life, when

the solid parts of the body are elastic, soft, and very dilatable, is that which requires more food to enable the body to sustain the force of this fatigue. It is proved by the narratives of travellers, and by the observation of naturalists, that the use of meat gives to man a very remarkable vigor, and renders the circulation more active. Aneurisms, therefore, often depend upon the force of the great vessels of the heart, the principal agent in the progressive movement continually made by the fluid blood. He observes that in London, one of the largest seaports, the men drink much wine, and therefore their bloodvessels on the surface of the body are often varicose, and excessively dilated. They are subject to frequent hemorrhages, and very great mortality. These accidents are common to the people of the North, to whom spirituous drinks are indispensable, by reason of the rigor of their cold climate. It is particularly in those icy climates where liquor is drank with the most impunity, because the bloodvessels are unnaturally compressed through the effect of the cold."

The Citizen Sarazin was thus far in advance of his predecessors and contemporaries. Indeed, we may say, he was a century in advance of his time; and, with certain exceptions to be hereafter noted, it will be seen that the statements are very nearly correct.

An examination of the writings of the fathers of medicine concerning the cause of aneurism does not reveal any profound knowledge of the subject or show that they probed beyond the general exciting causes which produced them. Galen says:—

"It happens in consequence of the skin in the neighborhood of a wounded artery cicatrizing, whilst an ulcer remains in the vessel, which neither becomes agglutinated nor cicatrized nor filled up with flesh." Aëtius is of opinion that it occurs most frequently in women "during parturition, on account of the forcible detention of the spirits." Fernelius has no positive opinion, but evidently differs from Galen when he says: "It is scarcely credible that some imagine that in these affections the vein or artery is ruptured or opened; for if the blood has escaped from the vein or artery, it would soon putrefy, and give rise to tumor of a different kind." Gorreus is not much more satisfactory in leading us to suppose that he knew much of anything about the subject of aneurism, although he arrives at the general conclusion that it is due either to a "powerful compression or an increased movement of the spirit, in consequence of which the vessels being distended give way; or from the vessel being divided with the superficial skin, whether accidentally or by the unskilfulness of a surgeon in bloodletting when he punctures an artery instead of a vein."

Ambroise Paré, in reviewing the works of his predecessors, takes a further stride in discussing the causation of aneurism, and writes: "It may also be occasioned" (he adds to Galen's causes) "by the wound of an artery, the superjacent skin closing and cicatrizing, whilst the wound in the vessel remains without being agglutinated, blocked up, or closed by flesh. Aneurisms may thus be occasioned by anastomosis, diapedesis, rupture, erosion, and wound." Jacques Guillemeau, following the opinion of the ancients, says that "an aneurism is occasioned when the blood and

spirits pass out of the vessels, in consequence of their orifices being opened, which is said to be by anastomosis; or when the coats of the artery are divided or ruptured, either from a wound or any other cause." Sennertus, after examining the doctrines of the older writers, concludes that "the approximate cause of an aneurism is an opening in the internal tunic and a dilatation of the external one." Fabricius informs us that "whatever kind of aneurism may follow a wound, either none of the coats, or, at most, the internal one only, is opened, the external one always uniting."

Robert Wiseman, the "Father of English Surgery," divided the causes of aneurism into internal and external: the former cause is from the "impetuosity of the blood, which, moving with greater violence in its channels than the artery can sustain, doth force its way through the side of the vessel, and, bursting a hole in it, doth issue into the space that lieth between it and the neighboring muscles and framing itself a nest." He also thought that the character of the blood, "being too sharp or thin, erodes the vessel; or, being highly fermented by other causes, bursts through all."

Lancisi was a little more explicit in his theory of the causation, but had not divested himself of the old theory of "humors and spirits." In his inquiry into the proximate or internal causes he found "no less than three which may either act singly or together. The first appears to be the concurrence of two blows in opposite directions, acting at the same moment on the same part of the artery. The second is the natural weakness of the arteries. The third is the existence of morbid humors in the body of the person struck."

As far as I can learn he is the first person who makes mention of syphilis as the cause, although he quotes Severinus in his treatise "*De Novissima Observatione Abscessus*" that aneurisms arise from syphilitic cachexia. Lancisi finally concludes with the assertion that "aneurisms do not arise from paralysis of the fibres covering the coats of an artery."

Alexander Monro, writing in 1733 on the subject of aneurisms, says: "The preceding account of the coats of arteries may let us see that no aneurism can happen unless through some fault of the interior coats," and in a list of the causes he gets no farther than "wounds, bruises, straining, loud laughing, crying," etc. Petit, his French contemporary, has no opinion to offer upon the causation of aneurism, except to say that "when a certain portion of an artery has lost its elasticity it becomes less capable of resisting the impulse of the blood." Haller concludes that it is not "at all improbable that the aneurism has arisen from a large number of osseous scales which did not admit of dilatation, and which were formed of the concretion of a yellow humor." William Hunter in his remarks on aneurism does not discuss the question of causation. Donald Monro, physician to St. George's Hospital, London, in his observations on aneurisms, confesses his ignorance of the causes of aneurism. He says:—

"The greater part of the true aneurisms we have any account of came of themselves, and no cause could be assigned for their origin. Strainings of the body, and increased momentum of the blood and a stop put to its free circulation through some of the large vessels, has been alleged to give rise to several. . . . Sometimes a scorbutic or venereal taint, or some other acrimony in the blood, has been accused; at other times particular obstructions or disease of the arteries, at the part where they were dilated, have been said to occasion them. And certainly there must either be a particular disposition of the blood, which renders it capable of softening or relaxing the arterial fibres, or some disorder in the fibres or vessels affected, or a particular quality in the fluids thrown upon such parts before an aneurism can be produced."

But further examination of the writings of our predecessors will be of no avail in the prosecution of this inquiry, and I may close this review by quoting the words of Lancisi, who had himself traversed the ground: "As far as I have been able to ascertain," he says, "a profound silence has been maintained by these very writers concerning those aneurisms of the heart, and of the larger vessels, which have been noticed by more modern surgeons and physicians in their frequent dissections." If we could communicate with Lancisi, we might tell him that, for one hundred years after he wrote these words, the "profound silence" which he bewails was strictly maintained by his successors, as Sarazin's article seems to have attracted little or no attention.

Alcoholism.—All recent writers singularly enough seem agreed that alcoholism, or the inordinate use of intoxicating liquor, is an undoubted predisposing cause of aneurism, but no statistics are brought forward to support the hypothesis. On the contrary; the general statement is made that the disease is most prevalent in England and Ireland, where the abuse of alcoholic drinks prevails; but Sweden and Norway, as will be shown, as well as Germany, are comparatively exempt—and the Germans and Swedes are, to say the least, not famous for sobriety. And the following letter from the superintendents of the three leading inebriates' homes in this country would seem to indicate, if any affirmative proposition can be proved by a negative, that the contrary is the fact:—

Dr. J. A. Blanchard, of The Inebriates' Home, Fort Hamilton, writes me that—

"We have never had a death from aneurism in this institution, nor any pronounced case of the same during the time I have been in charge, nor, as far as I can ascertain, previous to this."

Dr. Blanchard's statement is also corroborated by Dr. Crothers, the superintendent of Walnut Hill Lodge Inebriate Asylum, as follows:—

"I have never met a case of aneurism among the inebriates under my care. In the records of 700 cases which I have made, no cases of this kind have been noted. The statement you mention has grown probably from a fact published some years ago in London, that the stevedores or porters on the docks who drank to excess both beer and spirits, and lifted heavily, were found to have aortic aneurisms. In some German work on pathology, a statement has been made that the arch of the aorta was

always found dilated in persons who used spirits. I regret that I have not noted the authority of these statements, not considering them of importance. Theoretically, alcohol could not be the principal cause of aneurism, for the reason that other parts of the body would undergo degenerative changes, and death, long before this condition, would occur. When it appears in alcoholic cases, it must of necessity be due to *other causes largely.*"

The letter of Dr. Day, of the Washingtonian Home, Boston, is of the same tenor:—

"In the last twenty-seven years I have treated a little over *ten thousand* inebriates, and amongst all of these cases I have not in a single instance seen an *aneurism of the aorta*; and, indeed, I have not seen anything like aneurism, except sometimes an enlargement of the veins of the lower limbs."

Climate.—In regard to climate, I find that the generally expressed opinion that the disease is more common in northern climates is incorrect. Countries in the extreme north are notably free from aneurism.

The most striking feature of the climatic statistics is the large proportion of deaths from aneurism in the State of California. The Census Reports for 1880 show 64 deaths from aneurism in a total mortality of 11,530, representing a rate per thousand of 5.550, the largest of any in the United States. The Health Reports of San Francisco for three years, 1876, 1877, and 1883, show 130 deaths from aneurism in a total mortality of 16,827 from all causes, a rate per thousand of 7.72. In estimating the reasons for this disparity, which operates against California, it must be remembered that the population of California is made up principally of persons who have emigrated thither from different States of the Union and Europe. The census of 1870 shows that of 560,247 inhabitants, 350,416 were of native, and 209,831 of foreign, birth. Less than half of the native population at that period were born in California, and nearly all the remainder were immigrants from the New England and Middle States. Of the foreign born, 54,421 were from Ireland, 48,826 from China, 29,701 from Germany, 17,669 from England, and 10,660 from British America. It will be noted that the large proportion of these immigrants were natives of northern countries, whose climate is entirely different from that of California. The mean temperature of California is about 60°, from which point it does not vary much during the four seasons of the year, and it will be apparent that persons coming from cold climates to this mild, languid temperature, and retaining their habits of life and living under the new conditions, would become subject to those diseases of the circulatory organs which are affected by temperature. The necessities of life being cheap in California, meat especially so, and the people living on stimulating foods and native wines, which are to be obtained cheaply, are known to be prone to excesses in diet and over-

stimulation. Add to this the excitement following the opening of a new country, where the precious metals until lately formed the stimulus to exciting labor, we may see some of the prominent causes which have made aneurism such an important factor in the death-rate of California.

Dr. Hayne, of San Francisco, who has studied the predisposing causes of the prevalence of aneurism in California, says (*Pacific Medical Journal*, vol. vi. p. 117) that the nature of the climate, and the occupation of the people are the two great predisposing causes.

Mr. Barwell states that aneurism, which has always been less prevalent on the continent of Europe than in England and Ireland, is increasing there.

The correctness of Sarazin's views that hot climates, with great diurnal changes, and humid air, are a great predisposing cause, is borne out by statistics in a striking degree. It is found that the coast of the United States, with the exception of the most northerly portions, is that in which the disease is most prevalent, and that islands having a similar temperature have a relatively high rate of mortality from aneurisms, as the British Islands and New Zealand. The north coast of the United States is singularly exempt.

The vital statistics of Norway for 1875, 1876, and 1878, covering a total mortality of 44,043 deaths, show but four deaths from aneurism, a rate per thousand of 0.09.

The report of registrar-general for the province of Ontario, 1876, shows but 8 deaths from aneurism in a mortality of 18,623 from all causes, representing a rate per thousand of 0.43.

The State Board of Health of Michigan, in its reports for 1870-76, a period of seven years, reports a mortality of fifteen deaths from aneurism in a total of 85,189 from all causes, representing a rate per thousand of 0.17.

In 10,668 deaths in Iowa, during 1883, but three deaths from aneurism are recorded, a rate of .028 per thousand. In Connecticut, during a period of seven years, comprising a mortality of 71,566 deaths from all causes, 71 were from aneurism, a rate of .009 per thousand.

The statistics of four large cities, showing a total mortality during an average period of five years of 222,637 from all causes, and of which 521 were deaths from aneurism, give a rate per thousand of .312. The U. S. Census mortality statistics of 1880, for the entire United States during twelve months, comprising 776,893 deaths from all causes, of which 478 were from aneurisms, gives a rate per thousand of 0.63, which leaves us to infer that the population of cities is more subject to aneurism than the population of the country at large.

Table from the U. S. Census Report, 1880.

	Population.	Deaths from all causes.	Deaths from aneurism.	Rate per thousand.
TOTAL UNITED STATES	50,155,783	756,893	478	0.63+
Alabama	1,262,505	17,929	7	0.39+
Arkansas	802,525	14,812	3	0.20+
California	864,694	11,530	64	5.55+
Colorado	194,327	2,547	1	0.39+
Connecticut	622,700	9,179	2	0.22+
Delaware	146,608	2,212	2	0.90+
Florida	269,433	3,159	3	0.95+
Georgia	1,542,180	21,549	9	0.42+
Illinois	3,077,871	45,017	15	0.53+
Indiana	1,978,301	31,213	9	0.36+
Iowa	1,624,615	19,377	4	0.21+
Kansas	996,096	15,160	2	0.14+
Kentucky	1,648,690	23,718	8	0.74+
Louisiana	1,039,946	14,514	23	1.59+
Maine	648,936	9,523	2	0.21+
Maryland	934,943	16,919	8	0.47+
Massachusetts	1,783,085	33,149	21	0.64+
Michigan	1,636,937	19,743	3	0.15+
Minnesota	789,773	9,637	4	0.44+
Mississippi	1,131,597	14,583	7	0.48+
Missouri	2,168,380	36,615	12	0.33+
Nebraska	452,402	5,930	1	0.17+
Nevada	62,266	728	2	2.75+
New Hampshire	346,991	5,584	5	0.88+
New Jersey	1,131,116	18,474	17	0.92+
New York	5,082,871	88,332	93	1.05+
North Carolina	1,399,750	21,547	5	0.23+
Ohio	3,198,062	42,610	15	0.35+
Oregon	174,768	1,864	3	1.61+
Pennsylvania	4,282,891	63,881	57	0.89+
Rhode Island	276,531	4,702	4	0.85+
South Carolina	699,577	15,728	6	0.57+
Tennessee	1,542,350	25,919	11	0.42+
Texas	1,591,749	24,735	7	0.25+
Vermont	334,286	5,024	0	
Virginia	1,512,565	24,681	18	0.73+
West Virginia	618,457	7,418	6	0.81+
Wisconsin	1,315,497	16,011	3	0.19+
TERRITORIES.				
Arizona	40,440	291	1	3.44+
Dakota	135,177	1,304	1	0.77+
District of Columbia	177,624	4,192	6	1.43+
Idaho	32,610	323	0	
Montana	39,159	336	1	2.98+
New Mexico	119,585	2,406	1	0.41+
Utah	143,963	2,414	1	0.41+
Washington	75,116	735	0	
Wyoming	20,789	189	2	10.5+

New York (compiled from Health Reports).

Population, 1870 942,292

Mortality Statistics.

Year.	Deaths from all causes.	Deaths from aneurism.	Per cent.
1870	27,175	77	00.27
1871	26,076	68	00.25
1872	32,647	73	00.22
1873	29,084	77	00.26
	115,882	295	

San Francisco (compiled from Health Reports).

Population, 1880 233,700

Mortality Statistics.

Year.	Deaths from all causes.	Deaths from aneurism.	Per cent.
1876	5,669	37	0.70
1877	6,170	45	0.70
1883	4,988	48	0.96
	16,827	130	

Chicago.

Population, 1870 299,227

Mortality Statistics.

Year.	Deaths from all causes.	Deaths from aneurism.	Per cent.
1870	7,323	4	.....
1871	6,976	7	.....
1872	10,156	0	.....
1873	9,557	12	.....
1874	8,025	3	.....
1875	7,899	2	.....
	49,936	28	

New Orleans.

Population, 1870 191,418

Mortality Statistics.

Year.	Deaths from all causes.	Deaths from aneurism.	Per cent.
1870	7,391	16	.....
1871	6,059	11	.....
1872	6,122	8	.....
1873	7,505	9	.....
1874	6,798	13	.....
1875	6,117	11	.....
	39,992	68	

The medical statistics of the Provost-Marshal-General's Bureau, compiled by Surgeon J. H. Baxter, U. S. A., afford some interesting and curious figures regarding considerations of nationality, occupation, complexion, and social condition. There were recorded 501,068 medical examinations of adult males for enlistment in the Union army during the Rebellion, 1861-65. Of this number 162,820 were rejected for various causes, and of those rejected 89 had aneurisms, being a rate per thousand of .178.

Relation of Nationality to Aneurism.—The table relating to nationality does not serve as a distinct landmark in our study of predisposing causes of aneurism. 989 applicants for enlistment were natives of Holland, of whom one was rejected for aneurism, a rate per thousand of 1.011. Scotland comes next, the rate being .288, Germany following close at hand

with .255, the United States next with .193, Ireland .139, England .063, and British America .046. Fifteen other nationalities are recorded as having no rejections for aneurism, but their relations to the equator are so diverse that questions of climatic influence have no bearing upon an examination of the figures.

Nationality.	Number examined.	Rejected for aneurism.	Rate per 1000.	Number rejected.
Holland	989	1	1.011	
Scotland	3,476	1	.288	
Germany	54,944	14	.255	
United States	341,569	61	.193	
Ireland	50,537	7	.139	
England	16,196	1	.062	
British America	21,645	1	.046	
Mexico	91	0	.000	
South America	79			
West Indies	580			
Wales	1,104			
France	3,243			
Sweden	1,190			
Norway	2,290			
Denmark	383			
Switzerland	1,802			
Spain	148			
Portugal	81			
Italy	339			
Russia	122			
Hungary	89			
Poland	171			
Total	501,068	89	.176	162,820

Complexion.—The statistics of complexion are worthy of some consideration.

There were 117,029 males of dark complexion examined, of whom 13 were rejected for aneurism, a rate .111. There were 217,292 persons of light complexion examined, of whom 36 were rejected for aneurism, a rate of .166, which would apparently show that persons of light complexion are at a disadvantage to persons of dark complexion in the development of aneurism. In the study of the question of sex, social condition, etc., it is universally admitted by all authors that females are less subject to aneurism than males. This is a point in favor of the theory that excessive muscular exercise is an important factor in the production of aneurism when we consider that the table shows precisely that difference between the frequency of the disease in the sexes which would naturally result from the difference in the amount of muscular exertion. The Provost-Marshal-General's medical statistics give a record of 159,393 married men examined, of whom 34 were rejected for aneurism, a rate of .213 per thousand, while of 174,928 single men but 15 were rejected for aneurism, a rate of .086 per thousand, showing an apparent advantage in the case of single men of nearly two and a half to one, from which it might be argued that celibacy was a probable prophylaxis against aneurism, and

this, a conscientious recorder is bound to add, seems the *reductio ad absurdum*.

	Examined.	Rejected.	Rate.
Dark	117,029	13	.111
Light	217,292	36	.166
	334,321	49	.147

Social Condition.

	Examined.	Rejected.	Rate.
Married	159,393	34	.213
Single	174,928	15	.086
	334,321	49	.147

Nationality.—In regard to nationality, statistics throw but little light on the subject. The only attempt on a large scale is found in the statistics of the Provost-Marshal-General's Bureau. The statements in regard to racial predisposition seem to have no better foundation than those in regard to syphilis. The statistics cover the examination of 501,068 men for enlistment, of whom 89 were rejected for aneurism. The "jugglery of statistics" is singularly shown by this table, for the large percentage found among Germans looks curious, when taken in connection with the admitted fact that Germany has a very low percentage of aneurisms.

Occupation and Temperature.—As to occupation, there seems no doubt that soldiers and merchant sailors are largely predisposed to aneurism. The statistics of the British Army, as set forth by Inspector-General Lawson, show a greater mortality than in our own.

The question of occupation to aneurism as studied in the following table only affords us presumptive evidence.

Relation of Occupation to Aneurism.

	Total examined.	Aneurism.	Rate.
Gunsmiths	466	1	2.146
Servants	1,083	1	.923
Grocers	1,107	1	.903
Masons	2,618	2	.764
Tailors	2,787	2	.718
Cabinet-makers	1,475	1	.678
Miscellaneous occupations	1,617	1	.618
Millers	1,828	1	.547
Tobaccoists	1,964	1	.509
Boatmen	4,669	2	.428
Merchants	4,718	2	.424
Carpenters	11,740	4	.341
Blacksmiths	6,105	1	.164
Farmers	137,425	22	.160
Sailors	9,219	1	.108
Mechanics	16,422	1	.096
Laborers	59,464	4	.067
Bakers	1,975	11	.506

Of 72 occupations recorded, but 18 have been credited with rejections for aneurism, and of these, if percentages be counted, gunsmiths head the list with the enormous rate of over 2 per thousand, while the unskilled laborer has only .067; but there was only one case reported among gunsmiths, and a small number examined. The largest number of persons examined belonging to any one occupation was that of farmers, of whom 137,425 were examined, and 22 rejected for aneurism, a rate of .160, which may be set down as the nearest approach to certainty of relation of occupation to disease among all the persons examined, for it is manifest that the percentage obtained by gunsmiths is due to the small number examined.

The influence of occupation is well shown in the statement of Inspector-General Robert Lawson,¹ that in 1866 the deaths from aortic aneurism in the English Army were eleven times more frequent than among the civil population. A statistical comparison of the occurrence of all forms of aneurism gave:—

- 0.36 per 1000 among men of the Footguards and Line in the United Kingdom during 1862-65. (176,320 men.)
- 0.10 per 1000 among 217,170 men in the navy during the same time
- 0.09 per 1000 among 507,405 men (?) of the civil population of London in the year 1861.
- 0.9 per 1000 among 29,930 men of the white troops at Cape Colony during 1860-66.
- 0.7 per 1000 among 42,482 men of the white troops in New Zealand during 1860-66.

The navy list shows less mortality than either merchant sailors or soldiers. Much of this apparent exemption is doubtless due to the fact that they are invalided and discharged as soon as the disease is discovered, and thus swell the civilian rate. It is greatly to be regretted that the earlier Marine Hospital records do not show any rating of the men, on account of the Master's Certificate following the statutory definition of the term seaman. Thus, from the statistics, it is now impossible to prove what has been a matter of belief in the service, namely, that firemen are as subject to aneurism as they are admitted to be from heart disease and apoplexy with resultant hemiplegia. But in regard to the British Army, it is to be observed that the statistics are mostly drawn from the troops stationed in India, at the Cape of Good Hope, Honduras, and the West Indies, where the influence of climate has unimpeded sway, and at these points it is not believed that civil statistics would show any marked difference.

On investigation, however, I am compelled to think that firemen are not particularly subject to aneurism.

With a view of settling this question, I requested Passed Assistant-Surgeon Carmichael, of the Marine Hospital Service, now stationed at Pittsburgh, to investigate the diseases of glass-blowers and iron-workers,

¹ Army Medical Reports (1866), vol. viii. p. 548.

knowing that class of men to be exposed constantly to extremes of heat and rapid cooling off. The following is his report :—

“ I have the honor to forward mortality reports compiled from the death registers of the Pittsburgh Board of Health, with reference to the prevailing fatal diseases among glass and iron-workers, commencing with the establishment of the Board of Health in 1870, and ending in 1883. I can discover but two cases of aneurism returned as such, though the number of deaths returned under the vague term heart disease is considerable.

“ Diseases of the respiratory organs, including phthisis pulmonalis, as shown by the tables, cause the largest number of deaths among the workers in glass and iron. Attention is called to the number of cases of abscess of the liver, an affection said to be caused by exposure to a continued high temperature. The information obtained from those in charge of glass and iron factories, with reference to the health of the men employed, was unsatisfactory; some maintaining that those occupations were not injurious to health, and that the men employed by them lived to a good age. Others professed that they knew little respecting the health of the men employed by them, but thought they did not lose any men from sudden death. The temperature to which some of these workers are exposed is remarkable. I am informed, by the chemist of the Edgar Thomson Steel Works, that the men who work in the cupolas above the converters are exposed to a temperature of 145 degrees F., and work on half-hour shifts. He also informs me that their men suffer from diseases of the respiratory organs, owing to the sudden changes of temperature and the habit of drinking ice-cold water when the body is in a heated condition. Whether the latter would have any effect or not I cannot say, but the tables show that a large number die from lung affections. As I had no definite means of obtaining the average length of time a glass or iron-worker was employed, I thought it best to state the ages of the deceased, which you will find appended to the report for each year.”

The tables¹ accompanying the report substantiate in every particular the views expressed. Total number of deaths in 14 years (1870-1883) among this class of laborers, 834; of which 2 were from aneurism—a rate per thousand of 2.39.

I also requested Surgeon Sawtelle, of the Marine-Hospital Service, to examine the fire-rooms of six ocean-going steamers, six harbor-tugs, and six ferry-boats, as affording accurate knowledge of the condition of the fire-rooms, and the statements of the engineers were taken from the log of the engine-room.

¹ Owing to the elaborate and extended character of these tables, I am reluctantly compelled to omit them.

List of Ocean Steamships, Tug-boats, and Ferry-boats, with average temperature of fire-room in each case, when under way, as furnished by the engineers of the respective vessels.

Date.	Name of vessel.	Route.	Average temperature of fire-room as estimated by engineers.
STEAMSHIPS.			
April, 1884.	City of Berlin.	New York to Liverpool	110°
"	" Santiago.	" " Havana	120 ¹
"	" San Marcus.	" " Galveston	90 ¹
"	" City of Puebla.	" " Vera Cruz	92
"	" Neptune.	" " Boston	98
"	" St. Romans.	" " London	86 ¹
"	" Finance.	" " Rio	107½ ¹
TUG-BOATS.			
"	" Gus. C. Adams.	New York Harbor	107½
"	" John Fuller.	" " "	115
"	" James Roy.	" " "	105
"	" Edwin Hawley.	" " "	117½
"	" Cyclops.	" " "	110
"	" F. D. Spraker.	" " "	100
"	" W. H. Vanderbilt.	" " "	100
"	" H. I. Vosburgh.	" " "	100
"	" Ivanhoe.	" " "	95
FERRY-BOATS.			
"	" Southfield.	New York to Staten Island	110
"	" Northfield.	" " "	100
"	" Westfield.	" " "	100
"	" Middleton.	" " "	95
"	" Fulton.	" " Brooklyn	110
"	" Farragut.	" " "	110
Average temperature for steamships			100+
" " " tug-boats			105+
" " " ferry-boats			104+

The average temperature of the fire-room of ocean-going steamers while under way is shown to be 100+, of harbor-tugs 105+, and of ferry-boats 104+. The maximum temperature was reached in the case of the steamer "Santiago," plying between New York and Havana, and the second highest on the "Finance," plying between New York and Rio de Janeiro; the first, 120°, the second, 107°. The lowest fire-room temperature was in the case of the steamer "Romans," plying between New York and London, 86°. A singular feature in the table is that the vessels showing the highest temperature are said to be "well ventilated." Notwithstanding the high temperature to which firemen are thus constantly subjected, it does not appear that they are more subject to aneurism than other classes of sailors. These facts, together with the mortality statistics of the workmen on shore, where they are subjected to even higher temperature, would indicate that increase of temperature alone is not a specially predisposing cause of aneurism.

SUMMARY.—In conclusion, it will be seen that, as far as this inquiry has extended, the only constant element among all the alleged causes of aneurism is that of climate; that neither syphilis nor alcoholism, nor occupation, nor heat alone, appears to have an appreciable influence on the

¹ Fire-room well ventilated.

causation of this disease. As to how far the influence of diet may extend in the production of aneurism, I have been unable to form any conclusion, but it is possible certain kinds of food may have a powerful influence. There are, as far as known to me, no systematic statistics showing the daily food of the population in any considerable portion of the earth. We know in general terms that the Eskimo eats whale blubber and seal fat, that the Chinese eat rice, with now and then a sucking pig, and that travellers have told us that the poorer classes of Sweden live on the most meagre diet with which it is possible to sustain life; but these statements are mere rambling generalizations. Let us trust that the United States in its new bureau of labor statistics, which I believe is obliged to gather statistics on this very point, may at least give us something definite, which may throw a light not only upon the particular disease in question, but upon all other acquired diseases. There is no doubt that any study into the causation of *any disease* is incomplete which does not take into consideration the food as well as the environment of the individual. Medical geography is important, but the study of alimentation is quite as important.

Frequency of Aneurism among Merchant Sailors (from Marine Hospital Reports).

Year.	No. of patients.	Mortality.	Cases of aneurism.	Deaths from aneurism.	Per cent.
1872	13,156	531	8	5	
1873	13,529	646	7	7	
1874	14,364	452	15	1	
1875	15,009	463	12	4	
1876	16,808	434	11	2	
1877	15,175	379	11	2	
1878	18,333	324	15	7	
1879	20,922	337	10	7	
1880	24,860	359	15	5	
1881	32,613	455	22	6	
1882	36,184	485	23	7	
1883	40,195	502	27	9	Rate per 1000
	261,038	5416	176	63	.114

ARTICLE VIII.

THE THERAPEUTIC USE OF IODOFORM-COLLODION, ESPECIALLY IN NEURALGIAS. By WM. BROWNING, of Brooklyn, Physician to Department for Nervous Diseases, Long Island College Dispensary.

It is our intention, in the present article, to give some experience with this remedy, together with notes on the preparation itself and a brief study of its action.

A detailed review of the previous uses of this solution is hardly necessary. Of late it has been much used in surgical dressings,¹ but it has also been advocated notably by Germans² in a few nervous troubles. My experience with it extends over a period of 3-4 years.

The method of application which has proven most satisfactory will be given first, then cases, and finally its action and the conclusions arrived at.

It is, of course, understood that this is an external remedy. The strength usually employed has been 1 of iodoform to 15 of collodion. Moleschott recommends a 10 per cent., and Cösfeld a 5-20 per cent., solution, while one of only 3 per cent. is sometimes used. A half ounce is usually sufficient for any ordinary single application. It keeps well if the bottle is properly corked, though a change takes place in it—iodine, as will be shown, being set free.

I have found it most effective when painted on in very thick layers. This is conveniently done with the usual camel's hair brush. As soon as one coating becomes a little firm another is applied, and so on until it appears to have an average thickness of 1-2 mm. Where contractile collodion is used, it should, by preference, be applied early in the day, that the patient's sleep be not disturbed, since it continues to shrink for some hours, and may thus occasion discomfort, though this is usually minimal compared with the neuralgia.

The paper-like layer will begin to break off in a day or two, and may be completely removed after forty-eight hours. If it cracks previously, a little oil or vaseline may be rubbed in. The nitro-cellulose is originally dissolved in a mixture of sulphuric ether and strong alcohol. Neither of these helps much in removing the crusts. I have also tried acetic ether, recommended by Binz, as a much better solvent, but it did not prove very useful, certainly not in removing thick crusts. The best way is to raise up a corner and tear off with a jerk. Of course any hairs on the integument should have been shaven close before applying.

In the neuralgic cases, a cure, when effected, was usually accomplished with one or two applications as just described. Where it simply gave relief, it was, like other symptomatic treatment, repeated accordingly. Starched garments directly overlying the application may become dark blue, to the consternation of the patient, until the cause is explained. The

¹ Of course its use in surgery, and, *e. g.*, as recently recommended by Lytle, in erysipelas, depends largely upon its antiseptic properties, and is for a purpose totally different from ours.

² Perhaps the first person to use iodoform in nervous affections was Kennedy (*Phila. Med. and Surg. Reporter*, May, 1867, and January, 1870), but his cases are not very clear. He used it for the most part internally, but later sometimes as an ointment. The first mention which I find of the use of the solution in collodion in these troubles is by Moleschott (*Wien. Med. Woch.*, 1873, Nos. 24, 25, and 26), who began using it about 1870, and refers to Kennedy. To Dr. L. Conrad, of New York, I owe my first knowledge of its possible usefulness in neuralgias.

yellow iodoform powder will also rub off somewhat after the coating has become dry. These little inconveniences might doubtless be avoided, if thought worth the trouble, by repainting, as soon as it is dry, with non-medicated elastic collodium, or, as has been suggested, with solution of gutta-percha. Occasionally patients speak of the spot feeling cool, perhaps meaning over-sensitive to cold, for some time afterwards. This, and occasional excoriation and slight pigmentation, are the only subsequent annoyances which I have noticed.

Supraorbital Neuralgia.

CASE I.—A man of 39 years, who claimed to have suffered from attacks of pain in the right frontal region for eighteen years. It had, however, never before lasted so long at one time—already two weeks. He could give no cause for his trouble; no history of malaria or syphilis. He had an unusually long, narrow skull, the more noticeable from his being a German. Dolorous point at exit of right frontal nerve. He was treated with a great variety of measures in the course of the first month; amongst others, internally with quinine, iodide of potassium, opium, digitalis, and salicylate of sodium, locally with cold, leeches, a veratrum ointment, and liniments of turpentine, camphor, ammonia, and chloroform. Yet, despite all efforts, the neuralgia persisted with only slight, transient improvement, chiefly after use of some turpentine liniment.

At the end of a month he was taken with typhoid fever, which ran a moderately severe but short course. Until fairly convalescent, a period of about two and a half weeks, he had no trouble from the neuralgia. Then it set in again, not at first as severe as formerly, but soon becoming so. The previous remedies now failed completely, whereupon a thick coating of iodoform-collodion was applied. It sufficed to dispel the pain, but left an indefinite tenderness; this with the pain-point disappeared after the second coating. The patient perceived no further unpleasant or peculiar sensations. He remained eighteen days longer under observation without any recurrence.

CASE II.—A large, blonde, healthy-looking man of 32 years, who stated that he had suffered a year previously from malaria. Claimed to have been feeling unwell this time for about five weeks. Began with pains in various parts of the body—nothing very definite. After taking a Turkish bath, the pain settled in the left half of the head, being especially severe about the forehead. The pain was worst about midday. Left eye constantly full of tears. The points of exit of the left supra-orbital, and in a less degree of the left occipital nerves, were sensitive to pressure. Said he had already taken quinine without avail. It was given again very faithfully, but to no purpose.

Two applications (interval of two days) of the iodoform-collodion to the distribution of the left supraorbital nerve sufficed to disperse all subjective symptoms. The sensitiveness of the pressure points had vanished. The profuse lachrymation lasted one day longer. He was seen fourteen days later, and had had no relapse.

CASE III.—Thin, nervous man of about 45 years, suffering from malaria. There was reason to suppose that the too industrious pursuance of his marital privileges was part cause of his nervous condition. His chills were soon stopped with quinine, but a severe supraorbital neuralgia

of one side persisted. One application of the solution remedied this. He did not continue either cure longer, though urged to do so. Some weeks later, I had a note from him saying that the chills were back again, but of the neuralgia he made no mention.

CASE IV.—Lighter than the preceding ones, of apparently malarial origin, and where quinine had helped, but did not entirely cure; the solution was also successful, although slower in acting.

CASE V.—Well-built man of 47. Works in a rather moist basement. First suffered from supraorbital neuralgia while in the army, twenty years ago. At that time it affected the left side. A sister said to have attacks of the same trouble. Thinks he acquired malaria in France some years ago, and that one attack of neuralgia was cured with a quinine mixture. Has had several attacks, oftener, as now, in the spring. The present very severe one had lasted a week already. Pain chiefly in right frontal region. Begins about 6 A. M. and lasts until a little after noon. He had used various strong liniments with little effect, though, on the whole, it was not quite so severe as at first. Exit of right supraorbital nerve over-sensitive to pressure. Quinine was given for two days without any noticeable improvement. It was then coated at evening with a thick layer of the solution. In his own words, "Pain returned next day, but not quite so severe; again a little less on second day, and on third there was none at all, but only a little soreness."

Dr. McNaughton, of Brooklyn, has favored me with the three following cases. He directs his patients, in case severe pain returns in a few hours, to remove the whole coating and apply afresh. He uses contractile collodion.

CASE VI.—An anæmic girl of 22 was attacked for the first time with right supraorbital neuralgia. Codeia internally. Iodoform-collodion locally. Next morning no better. Through a misunderstanding the codeia was dropped and the solution continued. By night the pain had disappeared. Relapse at end of a week. Remedied forthwith in the same manner.

CASE VII.—Married lady of about 30. First and only attack about a week after confinement. Unusually severe. Whole region tender. Three separate coatings in 2-3 days completely cured. No relapse at end of 8th month, though lachrymation in corresponding eye at times since.

CASE VIII.—Man of 35 years with measles. Neuralgia of supra-orbital set in with the appearance of the eruption on the head. The solution freely used gave no relief. The neuralgia lasted 5-6 days in all, and could only be relieved by hypodermics of morphia. No relapse in the 5 months since elapsed.

It was thought that there was some neuritis in this case. Evidently the neuralgia had some close connection with the measles-eruption.

A ninth case has been kindly reported to me by Dr. Bender, of Brooklyn.

CASE IX.—Man of 40 years, suffered a year previously from malaria, and seemed to be still suffering from a kind of malarial cachexia, although he had now no chills. His present complaint was a bilateral supraorbital neuralgia. Two or three applications (very thick) of iodoform-collodion quite relieved this. The neuralgia had not previously been treated in any way, but he received some quinine at the same time as the painting.

Dr. Bartley, some time since, also told me of at least one case where he had used it successfully. I have used, and known of its being used with advantage in several other cases of this affection, but cannot furnish the notes. It is proper to add that I have not known of its failure in any case of simple or idiopathic supraorbital neuralgia, and even brow-ague; although if the number of cases were larger there would naturally be failures to chronicle, as is the case with the best of remedies.

Eight cases at first resembling lumbago or sciatica, but proving either on immediate examination or subsequently to be as follows:—

CASE X.—Cheesy softening of two lumbar vertebræ with consequent bilateral psoas abscess, in a man of about fifty years (autopsy). In the middle stages of the trouble, which lasted $1\frac{1}{2}$ to 2 years, considerable amelioration of the patient's severe pain was secured by repeated local use of the solution.

CASE XI.—Tumor, size of fist, on inner surface of left os ilium with severe pain there and in lumbar region. The solution in front and over small of the back gave more relief, though of course but transitory, than any other measure. It seemed as if the tumor itself diminished in volume under the repeated applications. He went to work again slightly improved, and was lost sight of.

CASE XII.—Partial ankylosis of both hip-joints in a man of 48. Much pain on outside of thighs. Local use of the solution gave no relief from the pain.

CASE XIII.—Incipient spinal affection, at first simulating lumbago, the more so since patient claimed to have had previous attacks. The solution over the seat of pain and stiffness quite relieved him. After a time he came again, when the benefit from it was less. When last seen he had some symptoms of spastic spinal paralysis.

CASE XIV.—Tumor of kidney (autopsy), with pain in lumbar region. No benefit.

CASE XV.—Bladder trouble with severe lumbar pains, much relieved for brief periods by the solution.

CASE XVI.—Chronic kidney trouble, possibly of gouty nature. The pain in sacral region and thighs was at first somewhat relieved by the application.

CASE XVII.—Lumbago (myalgia) in a young man with a marked prominence of one of the lumbar vertebræ; this latter he claimed to have had from childhood. The severe, subjective, radiating and local pains were only slightly improved by the solution, though the diffuse tenderness to pressure, and the points were dispersed as far as the application extended. (Cured with faradic brush.)

Amongst these there is no case of idiopathic sciatica (recognized by some high authorities, *e. g.*, Paget, as rare), and at most but one of lumbago, viz. Case XVII. In the first seven of the series there was some tangible deep-seated cause, and of so serious a nature that any permanent improvement from this remedy was not to be expected.

Various Neuralgias.

CASE XVIII.—Intercostal neuralgia over right mamma in a man the subject of extensive arterio-sclerosis, and presenting nephritic symptoms.

This was completely relieved by a single local application. There was no relapse for a few weeks, but I believe he subsequently complained a little of similar pains, whether in the old spot I cannot say.

CASES XIX AND XX.—In at least two other cases of intercostal neuralgia (pleurodynia?) it proved successful.¹

CASE XXI.—Man of 29 years. Had a tooth drawn not long ago. Since then has suffered from what appears to be a neuralgia of the left facial nerve; its exit back of jaw painful on pressure. The solution locally. Cure. No relapse at end of 6 months.

CASES XXII AND XXIII.—Two cases of inframaxillary neuralgia (teeth sound) cured in this way have been related to me by medical friends. In these it would appear, from the suddenness of the relief, that the ether was perhaps the chief agent.

CASE XXIV.—Man of 42 years. At a recent fire he caught cold in the left side of the neck. Pain is severe in the morning, lessens about 9 or 10, but gets worse again towards night. Can hardly sleep more than an hour, when he becomes restless. The fear of increasing the pain makes him keep his head very fixed. Pain runs at times into the shoulder or up to the ear. Very tender to pressure over the left occipital nerve, but not elsewhere. (It appeared to be rather a slight neuritis than a simple neuralgia.) Reports himself relieved by the solution, with a partial relapse three weeks later, which was again remedied in the same way. Whether the cure was then permanent cannot yet be stated.

CASE XXV.—Obstinate occipito-cervical neuralgia. Points of exit of occipital, and in less degree of frontal nerves, decidedly sensitive to pressure. After two applications to both regions the pressure-tenderness had quite disappeared, but the neuralgic pains and general subjective condition were not essentially altered. Pressure-sensitiveness returned to a slight degree after a couple of months, but never became marked again. [This case I have ventured to call an occipito-cervical neuralgia for want of a better term. Neuralgias having this seat are known to be very obstinate.]

Spinal Irritation.

CASE XXVI.—Thin, middle-aged workingman. Pain in middle dorsal region of back while standing or moving; "cramps" encircling upper part of abdomen, especially about stomach. Great tenderness of the said spinal region on pressure, soreness when lying on it, etc. No known cause unless bending over his work. Cold locally and rest were first tried, but to no great purpose. The iodoform-collodion was then used. It relieved so far that he returned to his work, though he still felt some "uncomfortableness" at the back. Not seen again.

CASE XXVII.—Woman. Hyperæsthesia along spine and in lower limbs. Great tenderness to pressure laterally from the spinous processes in two places, one in lumbar, the other in dorsal region. After the hyperæsthesia had been diminished by the electric brush, the two regions were coated with the solution. On removing this a day or two later, the pressure-tenderness at the nerve exits had completely disappeared. Subjective relief was, however, minimal, and it was not thought best to repeat the procedure.

¹ Moleschott mentions curing an intercostal neuralgia with syphilitic myocarditis by the external and internal use of iodoform for months. Not a very close parallel to my cases.

CASE XXVIII.—Lady with mild attack of spinal irritation. (Tenderness laterally to dorsal vertebræ, etc.) The solution gave temporary relief, much the same as did collodion alone.

CASE XXIX.—Woman of 31 years. Distressing pain and sensitiveness between shoulder-blades, especially when stooping or at work. Marked pressure tenderness about region of second or second and third dorsal vertebræ. Stout, otherwise healthy woman. Iodoform solution (1 : 12) locally. Improvement even subjectively, though there is still some pain in the arms and left shoulder. The spot formerly so sensitive can now be freely pressed, but there is a less tender spot two inches to the left of the old one.

These four cases, perhaps, illustrate the opinion of Anstie, that local applications are sometimes very successful, often, however, of no value. The internal administration of iodoform in spinal irritation has been recommended by Busch. On the whole, the solution will hardly be worth trying, except in slight and regionally limited cases of this affection.

The solution was also tried in a number of cases of enlargements of and effusion into joints, but not always with abiding benefit. In several cases of subacute and chronic rheumatic swelling of the *smaller* foot and hand joints in young adults, it did more than any other remedy. One young man, the balls of whose toes had for a long time been so tender that he could hardly step on them, was thus brought to his feet again—although not completely cured, even after several coatings. Another youth, a grocer's boy, with subacute swelling and tenderness of the middle tarsal joints, was thus cured. His first acute attack had been remedied quickly with salicylate, but this second less severe one did not yield to that remedy. He had had no relapse when I saw him again some time after. In certain other cases apparently as favorable as the above, no advantage was obtained. In one where finger and elbow-joints were the seat of swelling, only discomfort resulted. In another of chronic effusion into a knee-joint, no effect was derived from repeated use of this agent.

The usual procedure in these joint cases was like that previously detailed, a thick layer, and, where admissible, quite around the joint. With knee and elbow the popliteal and cubital spaces should be left free.

The mechanical compressing action of the contracting collodion¹ is in these cases one of the chief factors, and in applying regard should be had to securing this effect. To this principle Gamgee has recently called attention in connection with orchitis, etc. In this and in hydrocele it is rather customary to employ the solution in elastic collodion; the contractile, however, I have also found more effective. A good thick layer tears the skin less than a thin one.

¹ Collodion alone has been recommended for local use in acute rheumatism, *v. Phila. M. & S. Rept.*, 1880.

Besides the above cases I have tried the solution in at least an equal number of others; in some with success, but where complications or want of notes render them unavailable here; in others, mostly hopeless troubles, from some imagined analogy, without serious expectation of good resulting. These can be made use of only in discussing certain points. A trial of it in locomotor ataxy might be cited. It was thought that possibly the lancinating pains could be relieved in this way. The solution was repeatedly applied to considerable lengths of the spine. Effect, *nil*.

In regard to its action this solution is only to a limited extent a counter-irritant; it is much more gradual in accomplishing its full effect. There are some four principal ways in which its ingredients exert an influence:—

1. Ether and alcohol—rapid local anæsthetic.
2. Nitrocellulose—mechanical by its contraction.
3. Iodoform—slow local anæsthetic.
4. Iodoform and free iodine—absorbefacient.

1. The evaporation of the ether and alcohol produces a degree of cold sufficient for the time being to drive the blood pretty completely from the immediate tissues, and reduces very markedly the cutaneous sensibility. Ether pure has been much used for this latter purpose, either as spray, or, as advocated by Hughes, in form of lavements and douche. The application of simple collodion for this purpose is often preferable to either of these methods. It seems to stick to the skin more tenaciously than the solution. The latter will in some cases dispel neuralgic pain in a few minutes without its returning. Here it is doubtless the ether that acts, although the iodoform may help to establish the cure. To the suggestion that in all cases it is the collodion and not the iodoform which relieves, it may be replied that in some cases, as, *e. g.*, Case 5, a *gradual* cure was effected by a single application, similarly in other cases by two applications. That in these cases it could hardly have been the contraction of the drying collodion is evidenced by some cases remedied by a solution in elastic collodion.

2. Then follows the powerful action of the contracting collodion. It not only keeps the skin very anæmic, but pulls vigorously on the nerve-endings, and this is kept up with increasing force for at least 6–8 hours. The effect of such contraction can be best studied after applying pure collodion, the membrane thus formed not obscuring the structures beneath. It pulls the skin from all directions, producing, if the area be large, folds and even fissures. The shrinkage in one case, where the coating of solution was not very thick, amounted to $\frac{1}{8}$ the diameter (4 to $3\frac{1}{2}$ in.); the area had consequently diminished about one-quarter.

It is known that "neuralgias can be lessened and even suspended completely by strong pressure over the point where the painful nerve emerges from openings in the bone," etc. Inasmuch as the solution is, where possi-

ble, also applied directly over such points, we can see that the long-continued pressure, though not so closely directed at the one spot in the nerve, may still have a very similar and more lasting action.

Perhaps protecting the part from air may help to relieve, like the use of pure flexible collodion in herpes. Dr. McNaughton tells me that in two cases of herpes quick and almost perfect relief was afforded by iodoform in elastic collodion, though possibly not better than might have been afforded by pure collodion.

3. As to the action of the iodoform there is more question. Its fresh solution in collodion is nearly colorless, slightly yellowish. On standing it gradually acquires an amber and presently a brownish red color very like that of tincture of chloride of iron. This must be due to iodine being set free, since it then gives the starch reaction, though iodoform powder alone or its fresh solution does not (v. also Odin, *Phila. M. & S. Rept.*, 1874, vol. 30, p. 84, who asserts the same and also claims that in red bottles less iodine is liberated).

It is known that iodine is often demonstrable in the urine after painting with its tincture or even after inunctions of iodine salve or oil. Moleschott in one case obtained its reaction in the urine only 25 hours after its external use, and saw it continue in one case five days after its application was stopped. Falkson (*Arch. f. Klin. Chirg.* Bd. 28, p. 112) is inclined from various experiments on animals to believe that dry crystallized iodoform can be absorbed through the intact epidermis. It is in this condition that the iodoform exists either in whole or in part in the dried scales from the solution, as may be seen by comparing them under the microscope with crystals formed from a solution in alcohol. A condition very favorable to epidermatic absorption is produced by the tension of the coating; for pressure is stated by Eulenburg (*Percutane Arzenei-application*, 1880) to greatly promote this. It is therefore presumable that some of the iodoform itself, and of the free iodine when present, passes through the epidermis and still more through minute fissures, on remaining so long in contact with it.

Iodoform has for some years been recognized as being either in strong solutions or in substance a very powerful local anæsthetic. It was originally used for relief of pain in open cancers, sores, etc. A solution of it in chloroform was also recommended for neuralgias. In this form, however, it does not seem to have any established reputation, partly perhaps on theoretical grounds. We believe that its solution in collodion is incomparably superior, and that as regards both efficacy and cleanliness this will prove a really satisfactory method for securing its local action where the epidermis is intact. Perhaps it should be stated that in lighter neuralgic affections a solution in elastic collodion has often sufficed, but where the trouble is obstinate or severe the contractile is far preferable.

This brings us to ask what part of the nervous system is acted upon,
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and in what way. Is it simply a local anæsthetic? We may recall the theory so strongly urged by Anstie and others, that idiopathic neuralgias are dependent on certain—probably anæmic—changes in the nerve-roots or centres.

If this be true, a remedy that directly cures them must do so by acting on the said central structures. From Schüller's well-known account (1874, reprint) of the effect upon the meningeal circulation, of large sinapisms, it is imaginable that the prescribed application might also have some effect upon the meningeal resp. cerebral vessels. Strange as it may seem, at least two Germans¹ have reported cases of meningitis (tubercular) cured by iodoform collodion, and Moleschott even claims to have cured acute hydrocephalus with it. Whether they accomplished what they believed or not, they seem to have succeeded in deeply impressing central nerve apparatus. From these considerations we must acknowledge that the remedy *may* have a powerful central action. Still, most of my own observations corroborate the view that it has a very decided effect on the peripheral portions of nerves, and that thereupon depended its value in my cases. The fact that in several cases of palpable peripheral nerve-lesions much relief was obtained from this measure indicates that the nerve-trunk was acted upon. Pretty decisive on this point, and otherwise interesting is another result which I have constantly observed. *The points in nerves, painful on pressure, lose this over-sensitiveness after one or two applications.* In simple neuralgias this appeared to occur simultaneously with the cure of the main trouble, but in other cases this was not so. In these (*e. g.*, Cases 17, 25, 27) the pressure tenderness indeed disappeared, but the malady itself did not seem to be much affected. It would therefore seem clear that the peripheral nerve-trunks or branches must have been acted upon. The power of dispelling the sensitiveness of these pain points, without in given cases affecting the main trouble, has not to my knowledge been specially called attention to in connection with any remedy. In these cases the dolorous point cannot be considered as identical with, or the cause of the chief trouble, but rather as consequent to it, the trouble itself being situated in some more central structure. Conversely, neuralgias cured by it are probably peripheral, thus furnishing additional evidence, were it needed, against accepting too widely the theory that their seat is in the posterior nerve-roots.

4. There is reason to believe that the absorbefacient action may also be of value; for, says Anstie, "the true Valleix's point, when it has become established for some time, is the scene of trophic changes involving hyperæmia and thickening of the parts surrounding the nerve." We have seen that the over-sensitiveness of these same points is remedied by the

¹ Bauer (*Deut. Med. Woch.* 1882, No. 18). Not a very clear case. Cured by use of the solution about neck and head for 4 weeks. Cœsfeld (*ibid.*, 1881, No. 37) believes he cured 2 out of 7 cases.

application. The skin doubtless remains more or less impregnated for some time. Possibly old solutions containing free iodine are more efficacious; if so, we have but to add the tincture to fresh solutions.

Some care should be exercised where the skin is very thin or tender. The method is therefore obviously and from experience less to be recommended in females than in males. In exposed parts of the body it may be objectionable for æsthetic reasons, yet, on the whole, less than the so freely used iodine.

The class of troubles found most amenable to this treatment was narrowly localized neuralgias, especially when corresponding to some particular nerve and not dependent on any demonstrable lesion. In fact, if a neuralgia, or what is thought to be one, proves intractable to this means, we should doubt its being a purely functional affection, and look carefully for some tangible cause. It has thus a certain diagnostic, as well as therapeutic value. Several times its complete or partial failure has led to a more searching and successful examination. Even in such cases much temporary relief is often afforded.

Prolonged use of a solution in elastic collodion might prove valuable in neuritis,¹ though I have never tried it in a well-marked case.

Supraorbital neuralgias, even of malarial origin, particularly if the miasmatic infection dates back some time, seem quite amenable to this treatment. Of course it is not recommended as a substitute for quinine here, but only as an adjuvant where the latter fails or acts too slowly.

In those cases where transient or ill-defined pain is felt, sometimes in one brow and again in the other, with perhaps frequent headaches or pains elsewhere, there is no occasion to have recourse to the solution. The same holds for indefinite and fleeting pains in other parts of the body.

Better results are usually obtained where the medical attendant can make the application himself.

ARTICLE IX.

A CONSIDERATION OF THE CLASSIFICATION OF FUNCTIONAL NEUROSES OF THE THROAT AND NOSE.² By H. CLINTON MCSHERRY, M.D., Professor of Diseases of the Throat and Chest in the Baltimore Polyclinic and Post-Graduate Medical School; Fellow of the American Laryngological Association, etc.

FUNCTIONAL neuroses of the larynx, the naso-pharynx, and œsophagus are, in some phases, constantly coming under the observation of all mem-

¹ Moleschott *l. c.*, thus cured a left sciatic neuritis following typhoid fever.

² Candidate's Thesis, presented to American Laryngological Association.